

WHAT IS CLAIMED IS:

1. A linear motor comprising:  
a stator;  
a movable element movable relative to said stator;  
5 and  
a metal film formed on a surface of at least one  
of said stator and said movable element.
2. The linear motor according to claim 1, wherein  
said stator has a coil, and said movable element has a  
10 magnet.
3. The linear motor according to claim 2, wherein  
said coil is covered with a jacket.
4. The linear motor according to claim 3, wherein the  
jacket forms a flow path for supplying a refrigerant  
15 that cools the coil.
5. The linear motor according to claim 3, wherein  
said metal film is formed on a surface of the jacket.
6. The linear motor according to claim 2, wherein  
said metal film is formed on a surface of at least said  
20 stator.
7. The linear motor according to claim 6, wherein  
said metal film formed on the surface of said stator is  
formed at least at a portion thereof which opposes said  
movable element.
- 25 8. The linear motor according to claim 2, wherein  
said metal film is formed on a surface of said movable  
element.

9. The linear motor according to claim 8, wherein said metal film formed on the surface of said movable element is formed at least at a portion thereof which opposes said stator.

5 10. The linear motor according to claim 1, wherein said metal film is formed of a nonmagnetic material.

11. The linear motor according to claim 10, wherein said metal film contains nickel.

10 12. The linear motor according to claim 1, wherein said metal film contains gold.

13. The linear motor according to claim 10, wherein said metal film has a thickness of 10  $\mu\text{m}$  to 30  $\mu\text{m}$ .

14. The linear motor according claim 1, wherein said metal film is formed by plating.

15 15. The linear motor according to claim 1, wherein said metal film has been subjected to mirror polishing.

16. The linear motor according to claim 1, wherein said metal film is grounded.

17. A stage apparatus comprising:  
20 the linear motor according to claim 1; and  
a movable stage integrally formed with said  
movable element of the linear motor.

18. A stage apparatus comprising:  
the linear motor according to claim 1;  
25 a stage moved by the linear motor;  
a chamber surrounding and hermetically sealing  
said stage; and

a vacuum mechanism for evacuating said chamber.

19. An exposure apparatus comprising the stage apparatus according to claim 18.

20. The exposure apparatus according to claim 19,  
5 wherein the exposure apparatus is an electron beam exposure apparatus.

21. A device manufacturing method comprising:

preparing the exposure apparatus according to claim 19;

10 applying a photosensitive agent to a substrate;  
exposing the substrate by using the exposure apparatus; and

developing the exposed substrate.